

WHAT IS CLAIMED IS:

1 1. A sound insulation system for use within a vehicle, the
2 sound insulation system comprising:

3 a layer of fibrous padding material having a first surface and an
4 opposite second surface, the first surface including multiple spaced apart
5 recesses, the second surface having a substantially flat surface portion that
6 extends over two adjacent recesses of the first surface;

7 wherein the recesses of the first surface are configured to define
8 multiple voids when the sound insulation system is mounted in the vehicle,
9 thereby enhancing acoustical performance of the sound insulation system.

1 2. The sound insulation system of claim 1 wherein the sound
2 insulation system is configured to be positioned proximate a floor pan of the
3 vehicle, and wherein the second surface of the layer of fibrous padding material
4 has a shape that generally conforms with the floor pan.

1 3. The sound insulation system of claim 1 wherein the layer
2 of fibrous padding material includes multiple generally vertically oriented fibers.

1 4. The sound insulation system of claim 1 wherein the layer
2 of fibrous padding material includes multiple vertically lapped folds.

1 5. The sound insulation system of claim 1 wherein the
2 recesses cooperate to provide an undulated configuration to the first surface of
3 the layer of fibrous padding material, the undulated configuration including
4 multiple, generally evenly spaced peaks.

1 6. The sound insulation system of claim 1 wherein the layer
2 of fibrous padding material has a thickness, and each recess has a depth that is at
3 least ten percent of the thickness.

1 7. The sound insulation system of claim 1 wherein the layer
2 of fibrous padding material comprises natural fibers.

1 8. The sound insulation system of claim 1 wherein the layer
2 of fibrous padding material comprises synthetic fibers.

1 9. The sound insulation system of claim 1 further comprising
2 a cover layer attached to the second surface of the layer of fibrous padding
3 material.

1 10. A flooring system for positioning proximate a floor pan of
2 a vehicle, the flooring system comprising:

3 a fibrous layer having multiple vertically lapped folds that
4 cooperate to define a first surface and an opposite second surface of the fibrous
5 layer, the first surface being adapted to face toward the floor pan and having
6 multiple recesses, the second surface having a shape that generally conforms with
7 the floor pan, the second surface further having a substantially flat surface
8 portion that extends over at least two adjacent recesses of the first surface; and
9 a cover layer attached to the second surface of the fibrous layer;
10 wherein the multiple recesses are configured to define multiple
11 voids when the flooring system is mounted in the vehicle, thereby enhancing
12 acoustical performance of the flooring system.

1 11. A method of forming a sound insulation system for use
2 within the interior of a vehicle, the method comprising:

3 positioning a layer of fibrous padding material having a first
4 surface and an opposite second surface between first and second mold sections of
5 a mold, the first mold section including a first mold surface having multiple
6 spaced apart projections; and

7 compressing the layer of fibrous padding material between the
8 mold sections such that the first mold surface forms multiple spaced apart
9 recesses in the first surface of the layer of fibrous padding material;

10 wherein the recesses are configured to define multiple voids when
11 the sound insulation system is installed in the vehicle.

1 12. The method of claim 11 wherein the layer of fibrous
2 padding material includes multiple generally vertically oriented fibers.

1 13. The method of claim 11 wherein the recesses cooperate to
2 provide a convoluted configuration to the first surface of the layer of fibrous
3 padding material.

1 14. The method of claim 11 wherein the second mold section
2 includes a second mold surface, at least a portion of the second mold surface
3 being substantially flat, and wherein the compressing step is performed such that
4 a portion of the second surface of the layer of fibrous padding material that
5 extends over two adjacent recesses of the first surface is formed substantially flat.

1 15. The method of claim 11 further comprising attaching a
2 cover layer to the second surface of the layer of fibrous padding material.

1 16. The method of claim 15 wherein the attaching step
2 comprises positioning the cover layer between the first and second mold sections
3 with the layer of fibrous padding material.

1 17. The method of claim 11 further comprising heating the
2 layer of fibrous padding material prior to the positioning step.

1 18. The method of claim 11 further comprising heating the
2 layer of fibrous padding material when the layer of fibrous padding material is
3 positioned between the mold sections.

1 19. The method of claim 11 wherein the layer of fibrous
2 padding material includes multiple vertically lapped folds that cooperate to define
3 the first and second surfaces.

1 20. The method of claim 11 further comprising lapping a fiber
2 layer to form the layer of fibrous padding material, wherein the lapping step is
3 performed prior to the positioning step.